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GIFFORD PINCHOT, Forester.

THE DRAIN UPON THE FORESTS.

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[Cir. 129]

THE DRAIN UPON THE FORESTS.

Every American who is abreast of current affairs is aware that the forests of the country are being cut down much faster than they are growing, but few have any very definite idea of just how much more wood is being cut than is being produced, nor of how long it may be, under present conditions and methods, before certain woods, now abundant, will be used up. Such information is not easy to obtain, and it is impossible to give more than estimates of the yearly growth.

The charts and data given in this circular are based upon statistics of forest products in 1906, compiled by the Bureau of the Census and the Forest Service, with the exception of those upon mine timbers, which were collected by the Forest Service and the Geological Survey for the year 1905.

THE KNOWN DRAINS.

Figure 1 shows the output of forest products in 1906, all classes being reduced to equivalent board feet for more ready comparison. Roughly, three times as much timber is used for lumber as for all the other items combined. Next to lumber come shingles, requiring 6.3 per cent as much timber as is used for lumber; hewed cross-ties require approximately the same amount. Domestic pulpwood takes 4.3 per cent as much timber as is used for lumber, and in addition large quantities of pulpwood are imported. Cooperage stock and round mine timbers require approximately equal quantities of timber; lath take 2 per cent, wood used for distillation 1.7 per cent, veneer 0.9 per cent, and poles 0.6 per cent of the quantity used for lumber.

The total quantity of timber used annually for lumber and the other products mentioned above is equivalent to approximately 50 billion board feet.

LUMBER.

The cut of lumber by species in 1906 is shown in figure 2. Yellow pine is far in the lead, furnishing 31.1 per cent of the total amount. Douglas fir comes second, with 13.2 per cent; white pine third, with 12.2 per cent; hemlock fourth, with 9.4 per cent; and oak fifth, with 7.5 per cent. Spruce and western pine furnish 4.4 per cent and 3.7

per cent, respectively. These seven kinds of timber furnish over four-fifths of the total, and no other kind reaches one billion feet of lumber annually. Under lumber is included sawed railroad cross-ties.

The three kinds of lumber which are most largely exported are yellow pine, redwood, and Douglas fir, the first going principally to Europe and the others most largely to Australia, the Orient, and

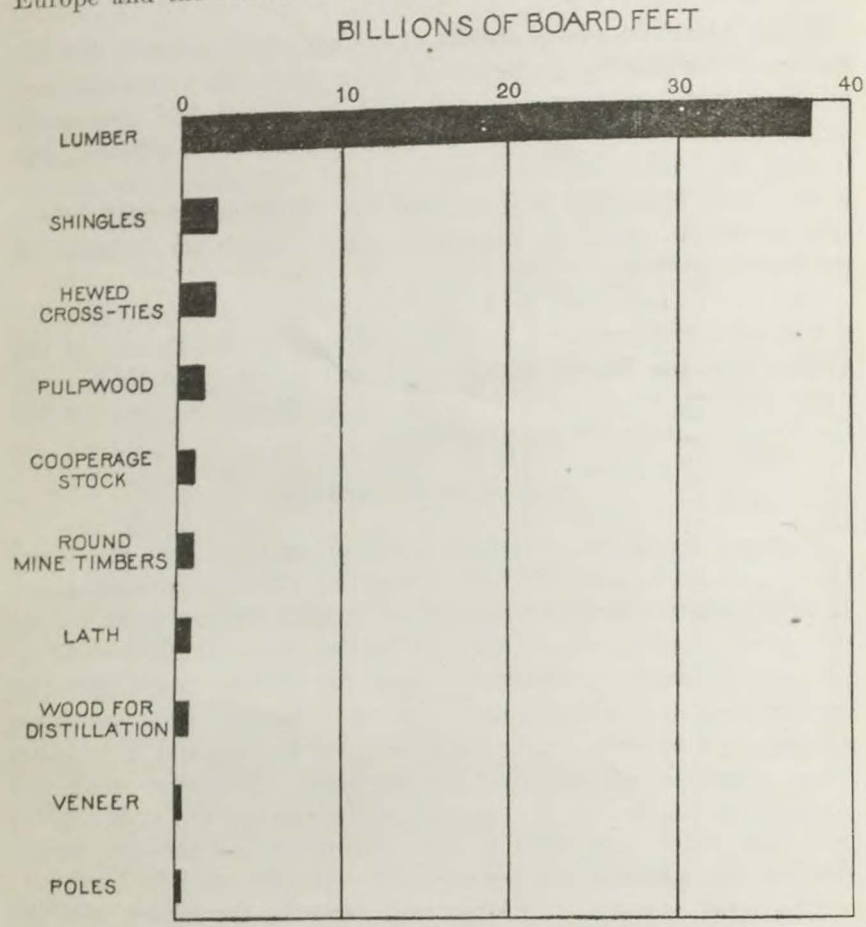

FIG. 1.—Forest products, 1906.

South America. In 1906 the exportations of yellow pine amounted to about 8 per cent of the total cut of yellow pine lumber, that of redwood to over 6 per cent, and that of Douglas fir to nearly 8 per cent of the cut. Considering all kinds, the exports of hewed and sawed timber and lumber amounted to about 5 per cent of the total lumber production in 1906.

The lumber cut by States in 1906 is shown in figure 3. Washington leads, with 11.5 per cent; Louisiana is second, with 7.4 per cent;

Wisconsin third, with 6.2 per cent; and Michigan fourth, with 5.6 per cent. The fifteen States which cut over one billion feet each in 1906 supplied nearly three-fourths of the total production.

The proportion of the total lumber production of the United States furnished by nine States in 1880 and in 1906 is shown in figure 4. In 1880 these States produced 52.8 per cent of the total amount, and in 1906, 51.5 per cent, practically equal proportions, but the changes which have taken place in the output of individual States are very striking. Michigan, for instance, cut 23 per cent of the total in 1880 and but 5.6 per cent in 1906; Louisiana cut 0.7 per cent of the total in 1880 and 7.4 per cent in 1906; Washington furnished but 0.9 per

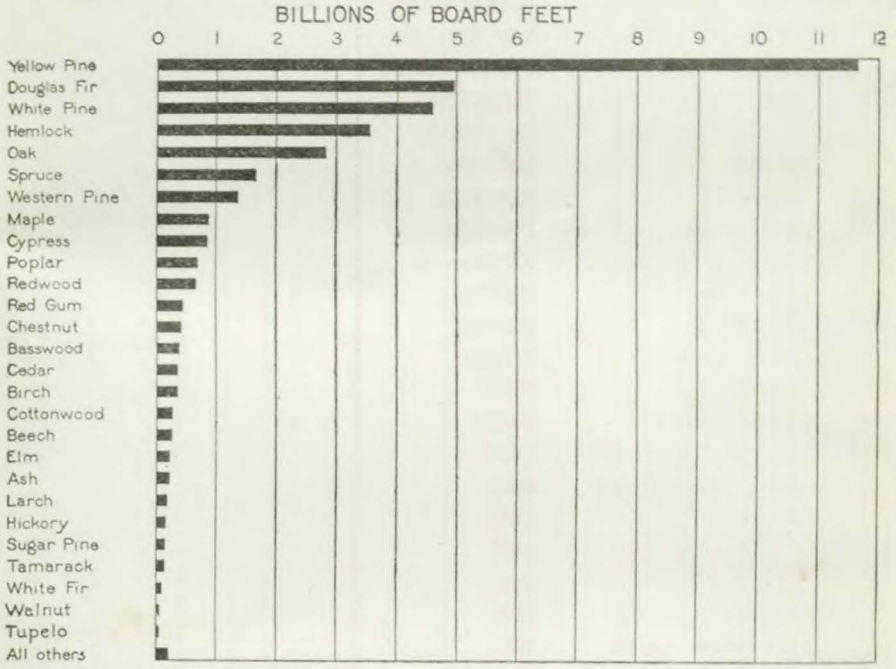

FIG. 2.—Lumber production by kinds, 1906.

cent of the lumber production of 1880 and 11.5 per cent of that of 1906. The cutting out of the virgin timber in the North and East has been followed by increased drains upon the forest resources of the South and West.

The hardwood and softwood lumber production in 1906 is shown in figure 5, the softwood cut being over four times the hardwood cut. There has been a very decided change in the ratio of hardwoods to softwoods in recent years. In 1899 the hardwoods furnished nearly 25 per cent of the total, against less than 19.5 per cent in 1906. This has been caused by a greatly increased cut of certain softwoods, together with a strong decrease in leading hardwoods. In the last

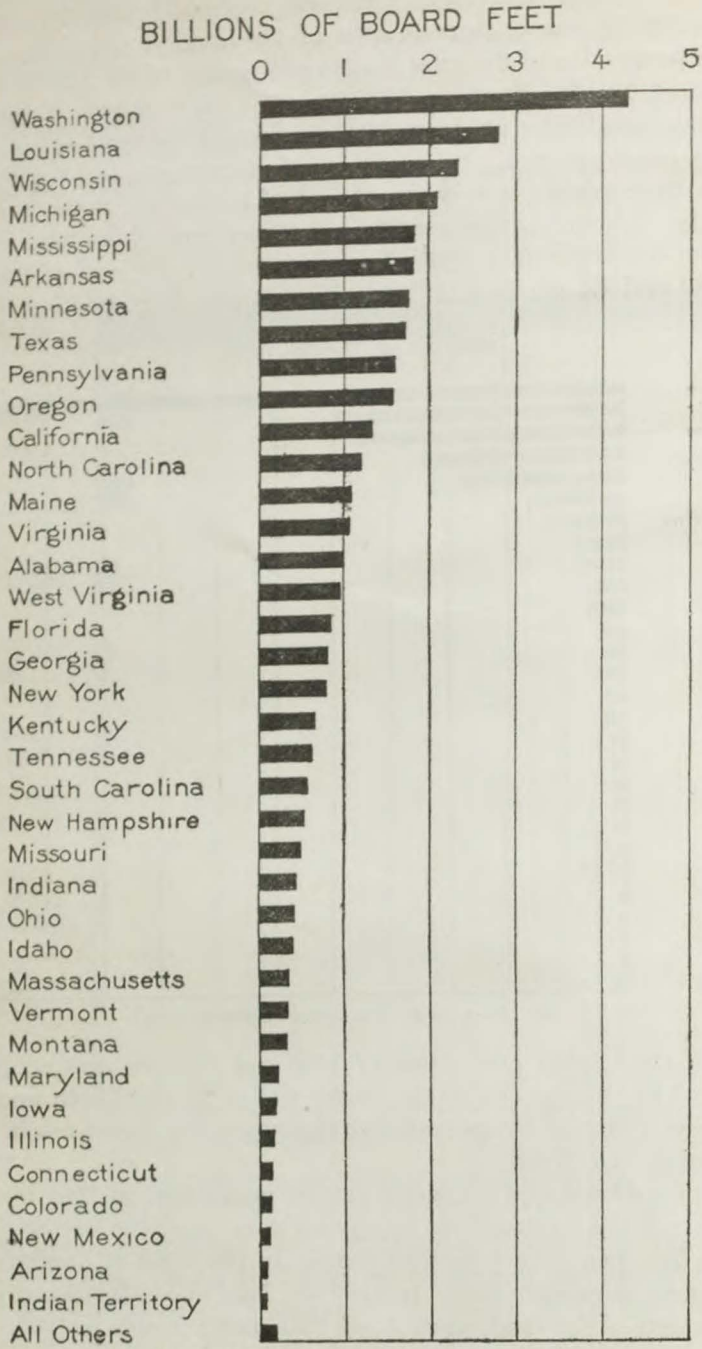

FIG. 3.—Lumber production by States, 1906.

seven years yellow pine has increased 20.7 per cent, western pine 46.9 per cent, cypress 69.3 per cent, redwood 83.2 per cent, and Douglas fir 186.2 per cent, which far more than counterbalance the decrease of 40.8 per cent in white pine. On the other hand, the cut of the two

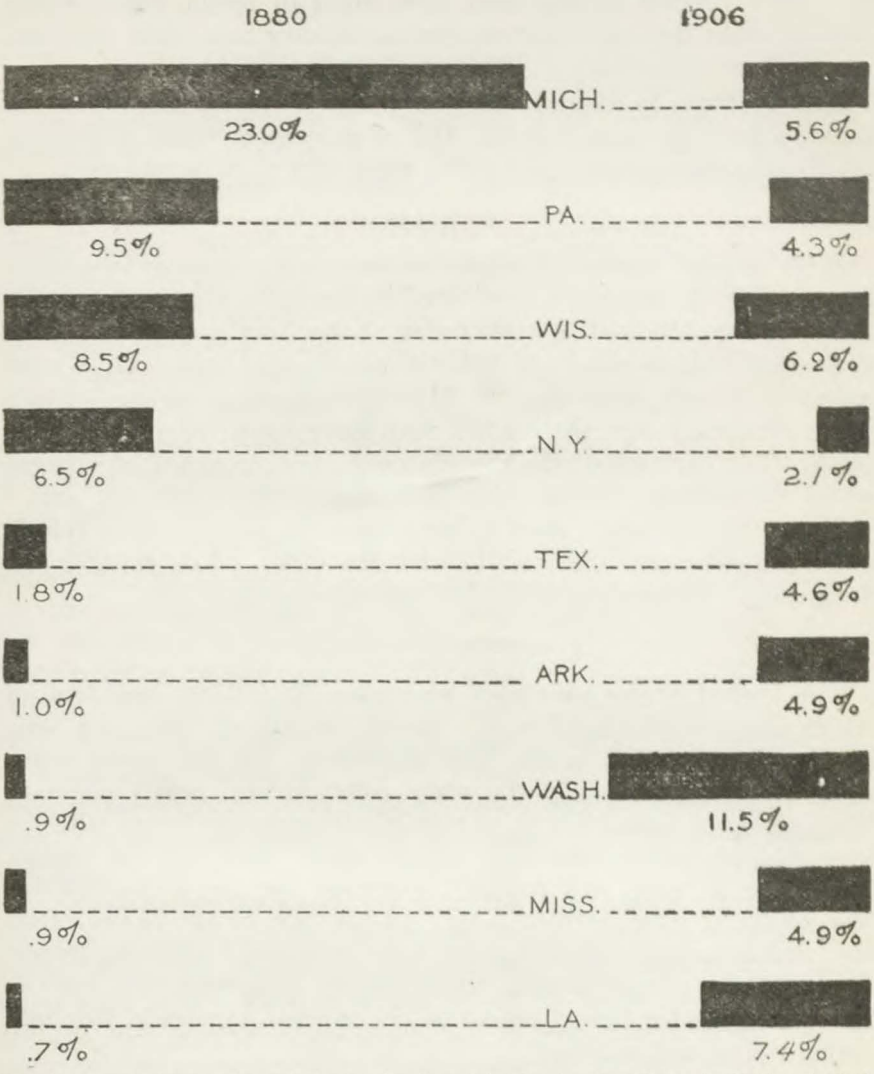

FIG. 4.—Comparison of the relative production of lumber by nine States in 1880 and 1906.

most important hardwoods, oak and poplar, has decreased 36.4 per cent and 38.7 per cent, respectively, in the same period.

The total lumber production reported by the censuses of 1880, 1890, 1900, and 1906 is shown in figure 6. The cut has more than doubled since 1880 and it is probably safe to say that, could wholly complete statistics be obtained, at least 40 billion feet would be shown at pres-

ent. The many substitutes for wood that have been proposed, and to some extent used, have not lessened the demand for lumber, as is shown by the fact that the per capita consumption was 360 board feet in 1880 and 440 board feet in 1906. However, the rate of increase in lumber production has been very small in recent years, which indicates that the maximum cut for the country as a whole has been nearly if not quite reached.

As was shown in figure 1, the production of lumber constitutes the heaviest drain upon our forests. It is of interest, however, to mention briefly the other purposes for which woods are most largely used.

SHINGLES.

While a large number of woods are used to a greater or less extent for shingles, the market is dominated by the cedar shingles, of which there are two kinds—the white cedar of the Northeastern and Lake States and the so-called red cedar of the Pacific coast. Of a total reported shingle production of 11,858,260,000 in 1906 the western cedar furnished over three-fifths and the eastern cedar about one-tenth. Ten per cent of the shingle production consisted of cypress, while redwood and yellow pine furnished nearly 7 per cent and 5 per cent, respectively. More cedar is used for shingles than for all other purposes combined, while with the other woods shingles are frequently a by-product of lumber manufacturing.

HEWED CROSS-TIES.

The United States uses each year over 100,000,000 cross-ties, of which three-fourths are hewed. Sawed ties are not discussed here, as they are included in the item of lumber. Of the hewed cross-ties, the oaks, and chiefly the white oaks, furnish nearly one-half. The cutting of hewed ties from young oak trees constitutes, with the exception of lumber, the most serious drain upon our oak forests. Two-fifths as much oak timber is required for ties as for lumber. The southern pines furnish nearly 18 per cent of the hewed cross-ties, and cedar and chestnut about 8 per cent and 7 per cent, respectively. Other woods which, while locally important, are used in less quantities for hewed cross-ties are cypress, tamarack, hemlock, western pine, and redwood.

PULPWOOD.

The domestic pulpwood used in 1906 amounted to over 2,900,000 cords and in addition some 738,000 cords were imported from Canada. More than three-fifths of the domestic pulpwood consisted of spruce and nearly one-fifth of hemlock. Poplar furnished the bulk of the remainder, with relatively small quantities of several other woods. The use of spruce is increasing, and at present nearly 60

per cent as much spruce is used for pulp as for lumber. Importations of spruce pulpwood have gained steadily, as the demands of the pulp manufacturers for spruce have exceeded the domestic supply. The use of hemlock has also increased rapidly, and now nearly 9 per cent as much is used for pulp as for lumber.

COOPERAGE STOCK.

The production of tight cooperage stock reported for 1906 amounted to over 267,000,000 staves and 17,700,000 sets of heading, and that of slack cooperage stock to 1,097,063,000 staves, 129,555,000 sets of heading, and 330,892,000 hoops. The total production of slack cooperage stock was undoubtedly considerably in excess of the figures given, as reports upon this subject were not received from some manufacturers.

FIG. 5.—Hardwood and softwood lumber production, 1906.

At least 90 per cent of the tight cooperage stock consists of white oak of the best quality, so that this constitutes a heavy drain upon the white oak supply. Probably more than one-tenth as much white oak is used for cooperage as for lumber. Over one-fifth of the oak staves annually produced are exported—principally to France, the United Kingdom, and Italy.

A large number of woods are used for slack staves and heading, the principal ones in order of importance being elm, pine, red gum, maple, beech, oak, chestnut, birch, and ash. For hoops little is used except elm, as this wood combines in a high degree the qualities of strength and toughness necessary for a good hoop. More elm is used for slack cooperage stock than is used for lumber.

ROUND MINE TIMBERS.

According to data gathered by the Forest Service and the Geological Survey upon the consumption of timber in mines in 1905, the quantity of round mine timbers used underground annually exceeds 165,000,000 cubic feet, of which over half consists of hardwoods. Like the making of hewed cross-ties, the cutting of round mine tim-

bers takes large quantities of young timber, and in many localities constitutes a most serious drain upon the forests.

LATH.

Lath are generally a by-product of lumber manufacturing and so are made from nearly every kind of wood that is cut into lumber. A comparatively few woods, however, furnish the bulk of the lath. The production of lath reported for 1906 was slightly in excess of 3,812,000,000, of which white pine furnished nearly one-quarter, yellow pine one-fifth, hemlock 16.2 per cent, Douglas fir 14.4 per cent, spruce 11.1 per cent, and cypress 4.7 per cent.

WOOD FOR DISTILLATION.

The amount of wood reported as used for distillation in 1906 was 1,195,130 cords, of which a little over 50,000 cords consisted of pine and the balance of hardwoods. The hardwoods distilled are chiefly birch, beech, and maple, but it is impossible to state the proportions. In some cases the wood used for distillation consists of the waste incident to logging and lumber manufacturing operations and so constitutes a saving, while in other cases the wood is cut especially for distillation.

VENEER.

Not less than 326,000,000 feet, log scale, of timber was used for the production of veneer in 1906. Many woods are made into veneer, reports upon some 20 kinds being received, but the larger portion is furnished by a comparatively few species. Over one-fifth of the total amount consisted of red gum and about one-seventh of oak, followed by yellow pine, maple, cottonwood, yellow poplar, hardwood, birch, elm, tupelo, spruce, beech, ash, and walnut. The making of thin lumber from pine, cottonwood, and similar woods upon veneer machines for boxes, baskets, and crates has increased rapidly in recent years. The veneering of such woods is for a wholly different purpose from that of the veneering of oak, maple, and other ornamental woods, where the sheet of veneer is spread upon a backing of inferior material.

POLES.

The telegraph, telephone, and electric-light companies reported the purchase of 3,493,025 round poles exceeding 20 feet in length in 1906. Over three-fifths of these poles consisted of cedar and more than 28 per cent of chestnut. Relatively small amounts of pine, cypress, redwood and other poles were also purchased. In addition to the poles required by these commercial companies, a large number of smaller poles were used for local telephone lines and similar purposes.

TANNING MATERIALS.

The tanneries reported a consumption of some 1,370,000 cords of bark and more than 387,000 barrels of tanning extract, made from domestic bark and wood, in 1906. Over two-thirds of the bark used was hemlock and the balance principally oak. Two-thirds of the domestic extract was made from chestnut bark and wood, and nearly all of the remainder from hemlock and oak bark. Formerly a great deal of hemlock was cut solely for the bark and the wood left to rot in the forest, and the same practice was followed to a less extent with oak, but at present the bark-producing trees are so generally utilized for lumber or other purposes that the manufacture of tanning materials can be said to constitute an additional drain upon the forests only in so far as the wood itself is used in extract making, as is the

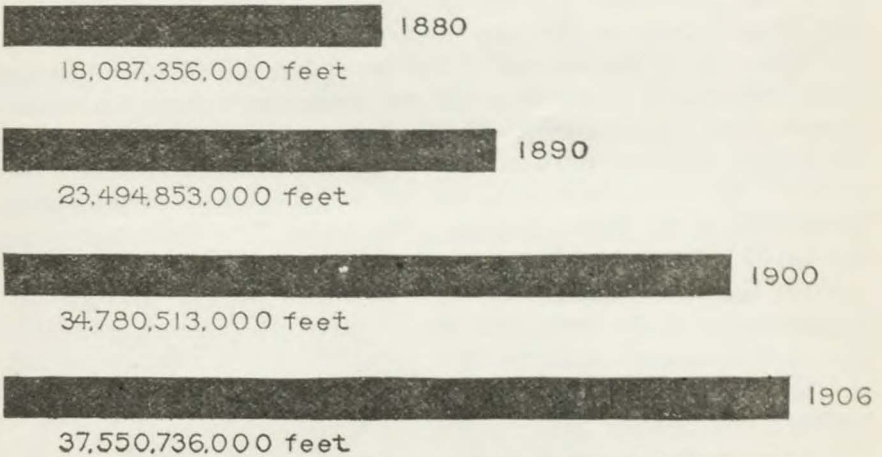

FIG. 6.—Lumber production of the United States, 1880, 1890, 1900, 1906.

case with chestnut. The tanneries are now supplementing the domestic supply of tanning materials by considerable importations of the bark and extract of quebracho, a South American tree. Over 267,000 barrels of quebracho extract were used in the calendar year 1906, and the total value of the importations of quebracho bark and extract in the fiscal year 1906 was nearly $2,400,000.

TURPENTINE AND ROSIN.

No recent statistics are available upon the annual production of turpentine and rosin. For the calendar year 1904 the Census secured reports upon a production of 30,687,051 gallons of turpentine and 3,508,347 barrels of rosin. Turpentine orcharding, according to the usual method of "boxing," has been very destructive to the longleaf pine forests of the South. The mere cutting of a "box" in the base

of the trees to catch the resin flowing from the faces above is not of itself sufficient to kill the trees, but small trees are often so weakened as to be easily wind-thrown, the box offers a means of ready entrance for injurious fungi and insects, and such favorable conditions are afforded for fire after turpentining ceases that to the production of naval stores must be charged a large drain upon the southern forests.

THE UNKNOWN DRAINS.

No satisfactory data have ever been collected upon the quantity of wood used annually for posts, fuel, and domestic purposes. The few statistics available indicate a cut of about 20,000,000 cedar posts in the Lake States in 1906, and of course many millions of posts were cut elsewhere.

The census of 1880 estimated that the annual consumption of fuel wood was practically 3 cords per capita. There has unquestionably been a relative decrease in the use of wood for fuel since that time, yet in the absence of further information it would seem hardly reasonable to say that the per capita consumption has been reduced more than one-half. If this be true, we are now using some 120 million cords of firewood annually. In order to be more conservative, however, the amount was estimated at 100 million cords in Circular 97 of the Forest Service. The latter quantity is equivalent to some 50 billion board feet.

Much timber is also destroyed or damaged by fires and storms. For example, in the year 1891 the Division of Forestry estimated that 12 million acres of forest land were burned over; and in the fall of 1906 a great deal of timber was thrown down by wind in the Gulf States.

Therefore it will be seen that all statistics and conservative estimates indicate that our present consumption of wood in all forms is equivalent to at least 100 billion board feet annually, and possibly much more. Indeed, one leading authority has estimated that the total annual use of wood in the United States is equivalent to 150 billion board feet.

THE SUPPLY.

In reply to the oft-repeated question, "How long will our timber supply last at the present rate of cutting?" only approximations can be given.

FOREST AREA, VOLUME, AND ANNUAL GROWTH.

The estimates of the forest area of the United States run from 500 million acres to 700 million acres, and it is safe to say that under present conditions the annual growth does not exceed 60 board feet per acre. This gives in one case a yearly increase of 30 billion feet

and in the other case one of 42 billion feet. In other words, it appears that the annual growth of our forests does not exceed the amount of wood used for lumber alone. Considering all the drains upon the forests, the annual consumption of wood is probably three times the annual growth. Figure 7 shows graphically the excess of the annual cut over the annual growth, based upon this assumption.

FIG. 7.—Excess of annual cut over annual forest growth.

HOW LONG WILL THE TIMBER LAST?

The estimates of standing timber in the United States are by no means satisfactory. The most detailed ones range roughly from 1,400 to 2,000 billion feet. Assuming a stumpage of 1,400 billion feet, an annual use of 100 billion feet, and neglecting growth in the calculation, the exhaustion of our timber supply is indicated in 14 years. Assuming the same use and stand, with an annual growth of 40 billion feet, we have a supply for 23 years. Assuming an annual use of 150 billion feet, the first supposition becomes 9 years, and the second, 13 years. Assuming a stand of 2,000 billion feet, a use of 100 billion feet, and neglecting growth, we have 20 years' supply. Assuming the same conditions, with an annual growth of 40 billion feet, we have 33 years' supply. With an annual use of 150 billion feet, these estimates become, respectively, 13 and 18 years.

FIG. 8.—Ratio of State and National forests to private and unreserved forests.

There is another way of looking at the question: The two leading kinds of lumber on the market now are southern yellow pine and Douglas fir. The cut of yellow pine is nearly one-third of the total lumber cut, and is nearly, if not quite, at its maximum. Our minimum and maximum estimates of yellow pine stumpage are 130 and 300 billion feet. The present rate of cutting will exhaust the supply in about 10 years in the first case and in 25 years in the second case, neglecting annual growth, which is rapid with old-field pine and slow with longleaf pine. The largest estimate of the stand of Douglas fir is 350 billion feet. This means a 70 years' supply at the present rate of cutting, neglecting annual growth. As it is probable, however, that the cut will more than double within a few years, the outlook is that there will be comparatively little Douglas fir left in from 25 to 30 years. The case of Douglas fir now is closely parallel to that of white pine in the Lake States 30 years ago, and there is much reason for believing that the supply of fir, outside of the National Forests, 30 years hence, will be as limited as that of white pine now.

WHO OWNS THE FORESTS.

At present only about 22 per cent of our total forest area is in State or National Forests, assuming a forest area of 700,000,000 acres, the remainder being on unreserved public lands or in private hands. This condition is represented graphically in figure 8. The forest area of the United States is amply sufficient, if rightly managed, to produce eventually enough timber to supply all our needs. Yet private owners, as well as the State and National Governments, must use their forest lands in a right way if we are to maintain our timber supply.

NEED OF ACCURATE DATA.

The wide divergence in the estimates upon both our wood consumption and our timber supply emphasizes strongly the importance of ascertaining accurately and with the least possible delay the quantity of wood annually consumed for every purpose, how much standing timber we have and where it is, and the rate of growth of all important species. Without this fundamental knowledge, it is clearly impossible to make right and permanent plans for the perpetuation and utilization of our forest resources.

Approved:
JAMES WILSON, *Secretary.*

WASHINGTON, D. C., *October 7, 1907.*

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